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(19)



## (54) BRIQUETTING COAL

(71) We, COAL INDUSTRY (PATENTS) LIMITED, a company organised in accordance with the laws of Great Britain of Hobart House, Grosvenor Place, London, SW1X 7AE England do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention concerns a briquetting process incorporating a pretreatment of the coal. The invention particularly concerns pretreatment of a high volatile weakly caking coal.

It is known from British Patent Specification No. 1,017,711 to heat a finely divided non-caking coal to a temperature in the range 600-900°C, this is mixed with a caking coal so that the mixture temperature is 400-500°C and the mixture is then briquetted without the addition of binder and without substantial drop in temperature. The green briquettes thus produced may be hardened by a thermal treatment comprising maintaining them in an insulated bunker under a substantially inert atmosphere without the supply of additional heat, wherein the briquettes degas slightly and increase in strength, for example, as disclosed in British Patent Specification No. 1,263,833. The briquettes may, of course, be carbonised or subjected to other known processing.

A common non-caking coal for this purpose is anthracite coal. It may be desirable to use a high volatile weakly caking coal because of economic considerations, but if such a high volatile coal is heated to 600-900°C the particles tend to swell. The swollen particles are not completely satisfactory for transferring heat to the caking component, give a mixture of low bulk density and may have other properties too poor to make satisfactory briquettes, for

example using a double roll press.

The present invention provides a method of briquetting coal which method comprises the steps of a) pre-treating a low rank, weakly caking high volatile coal in fine 50 particulate form by heating in the presence of oxygen at a temperature below the temperature at which substantial swelling of the coal normally occurs and for a time such that the property of the coal to 55 swell during a further heating step to above the normal swelling temperature is reduced, b) subjecting the pre-treated coal of step a) to a temperature in the range 600 to 900°C, c) mixing the heated coal with a 60 caking coal so that the mixture temperature is 400 to 500°C and d) briquetting the mixture without the addition of binder and without substantial drop in temperature. The pre-treatment step a) is conveniently 65 carried out in a fluidised bed reactor using air as the fluidising medium, although other oxygen-containing gases could be used.

It has been found that by varying the pre-treatment conditions, e.g. temperature and 70 reaction time, the swelling properties of a specific coal can be controlled to a substantial degree for the subsequent use of the coal in the hot binderless briquetting process. With long pre-treatment times it is 75 possible to reduce the potential swelling property to zero, and with shorter treatment times it is possible to retain some swelling or caking property. Suitable pre-treatment times are in the range 30 to 120 minutes, 80 preferably from 75 to 120 minutes, with preferred temperatures of 200-350°C. The actual size of the coal particles is not critical and can be determined with normal experimentation in each case; the governing 85 factor will probably be the size desired for the use of the coal particles in the briquetting process.

The temperature within the bed will depend upon the coal used and the properties 90

desired in the product and is a matter for simple experiment. The method involves an oxidation reaction which is exothermic, so that usually no external supply of heat is necessary for continuous pre-treatment, indeed it is sometimes necessary to abstract heat during the pretreatment to maintain the desired temperature.

The remaining steps of the method are known in the art and may be carried out in known manner. Routine experimentation may be necessary to attain particular desired properties in the final briquettes.

By using the method of the invention, it is possible to control the properties of one feedstock to the hot briquetting process and in particular to control the density of the mixture supplied to the briquetting press. It is then possible to produce briquettes with a density higher than would be obtained if high volatile coals untreated or pre-treated by some other method were used. Further, it is possible to produce briquettes of lower density than is possible using anthracite in place of a high volatile coal. For certain types of furnaces it may be beneficial to use briquettes of these intermediate densities.

The invention is illustrated by the following example.

#### EXAMPLE

A coal from Markham Main colliery, of CRC 802 rank (Coal Rank Code: "The Coal Classification System used by the National Coal Board" revised edn 1964, National Coal Board), of Swelling No.  $3\frac{1}{2}$  and of size distribution:

+ 10 BSS : 21%  
+ 60 BSS : 76%  
- 200 BSS : 7%, by wt.,  
is fluidised with air in a bed at a temperature of 220°C. With a residence time of 60

minutes, the product particles had a swelling No. of  $\frac{1}{2}$ .

The product particles are used in place of the "inert" particles in a method as described in British Patent No. 1,017,711, and strong dense briquettes result.

#### WHAT WE CLAIM IS:

1. A method of briquetting coal which method comprises the steps of a) pre-treating a low rank, weakly caking high volatile coal in fine particulate form by heating in the presence of oxygen at a temperature below the temperature at which substantial swelling of the coal normally occurs and for a time such that the property of the coal to swell during a further heating step to above the normal swelling temperature is reduced, b) subjecting the pre-treated coal of step a) to a temperature in the range 600 to 900°C, c) mixing the heated coal with a caking coal so that the mixture temperature is 400 to 500°C and d) briquetting the mixture without the addition of binder and without substantial drop in temperature.

2. A method according to claim 1, wherein the pre-treatment step a) is effected in a fluidised bed reactor.

3. A method according to claim 2, wherein the fluidising medium is air.

4. A method according to any one of the preceding claims, wherein the pre-treatment step a) is effected for 30 to 120 minutes at a temperature of 200 to 350°C.

5. A method according to claim 1, substantially as hereinbefore described.

6. Briquettes whenever produced by a method according to any one of the preceding claims.

For the Applicants.

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